

Chapter 10 Nuclear Chemistry**Section 10.3 Artificial Transmutation****(pages 303–305)**

This section discusses transmutations, transuranium elements, and particle accelerators.

Reading Strategy (page 303)

Monitoring Your Understanding Preview the Key Concepts, topic headings, vocabulary, and figures in this section. List two things you expect to learn. After reading, state what you learned about each item you listed. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Understanding Artificial Transmutation	
What I Expect to Learn	What I Learned

Nuclear Reactions in the Laboratory (page 303)

1. Define transmutation. _____

2. An example of a transmutation that occurs naturally is _____.
3. How do scientists perform artificial transmutations? _____

4. Circle the letter that identifies the scientist who performed the first artificial transmutation.
a. Ernest Rutherford b. Niels Bohr
c. Enrico Fermi d. Lise Meitner
5. The experiment that produced the first artificial transmutation also provided evidence that the nucleus contains _____.

Transuranium Elements (page 304)

6. Describe a transuranium element. _____

7. Is the following sentence true or false? All transuranium elements are radioactive. _____

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8. Scientists can synthesize a transuranium element by the artificial transmutation of a(n) _____ element.
9. Circle the letter of the first transuranium element to be synthesized.
 - a. plutonium
 - b. americium
 - c. technetium
 - d. neptunium
10. Circle the letter of the element that is used as a source of radiation in smoke detectors.
 - a. uranium
 - b. americium
 - c. technetium
 - d. plutonium

Particle Accelerators (page 305)

11. Why are particle accelerators needed for some transmutations? _____

12. Is the following sentence true or false? A particle accelerator can accelerate charged particles to speeds very close to the speed of light. _____
13. Describe a quark. _____

14. Circle the letter that identifies the number of quarks in each proton or neutron.
 - a. zero
 - b. two
 - c. three
 - d. six
15. Complete the following concept map about alpha particles.

